

## Claims

1       **Claim 1.** A watercraft, comprising;  
2               at least one hull having at least one planing surface;  
3               at least one vertical step in the planing surface;  
4               an onboard propulsion engine; and  
5               means for venting exhaust from the onboard propulsion engine at  
6               the vertical step in the planing surface while under way in order to  
7               introduce gas along the planing surface.

1       **Claim 2.** A watercraft as recited in claim 1, wherein:  
2               the vertical step in the planing surface includes an upper portion  
3               and a lower portion;  
4               the hull defines an exhaust-venting opening intermediate the upper  
5               and lower portions of the vertical step; and  
6               the means for venting exhaust from the onboard propulsion engine  
7               at the vertical step includes an exhaust-venting system extending to the  
8               exhaust-venting opening.

1       **Claim 3.** A watercraft as recited in claim 1, wherein the watercraft  
2               includes multiple hulls with multiple planing surfaces and multiple vertical  
3               steps, and the means for venting exhaust is arranged to vent exhaust at  
4               each of the multiple vertical steps.

1       **Claim 4.** A watercraft as recited in claim 1, wherein the planing surface  
2       includes multiple vertical steps and the planing surface retracts after each  
3       of the multiple vertical steps toward an original planing surface level.

1       **Claim 5.** A watercraft as recited in claim 1, wherein the planing surface  
2       includes multiple vertical steps and the planing surface is elevated after  
3       each of the multiple vertical steps from an original planing surface level.

1       **Claim 6.** A watercraft as recited in claim 1, wherein the vertical step in  
2       the planing surface includes an upper portion and a lower portion, and the  
3       hull defines an exhaust-venting opening intermediate the upper and lower  
4       portions of the vertical step that faces rearwardly from the vertical step.

1       **Claim 7.** A watercraft as recited in claim 1, wherein the vertical step in  
2       the planing surface includes an upper portion and a lower portion, and the  
3       hull defines an exhaust-venting opening in the upper portion of the vertical  
4       step that faces downwardly from the upper portion.

1       **Claim 8.** A watercraft as recited in claim 1, wherein the hull is an  
2       M-shaped boat hull.

1       **Claim 9.** A watercraft, comprising:

2           a hull having a fore end, an aft end, and a longitudinal axis  
3           extending between the fore end and the aft end;

4           a displacement body portion of the hull that extends between the  
5           fore end and the aft end, the displacement body having a static  
6           waterline, a port side, and a starboard side;

7           a first channel-defining structure portion of the hull that is located  
8           on the port side of the displacement body, including a first wing  
9           structure extending laterally from the port side of the displacement body  
10           above the static waterline and a first outer skirt structure that extends  
11           downwardly from the first wing structure to below the static waterline in  
12           spaced apart relationship to the displacement body, said first outer skirt  
13           structure having an outer surface that is substantially perpendicular with  
14           respect to the static waterline and said first channel-defining structure  
15           defining a first channel with a cross-sectional surface that is generally  
16           arcuate; and

17           a second channel-defining structure portion of the hull that is  
18           located on the starboard side of the displacement body, including a  
19           second wing structure extending laterally from the starboard side of the  
20           displacement body above the static waterline and a second outer skirt  
21           structure extending perpendicularly downwardly from the second wing  
22           structure to below the static waterline in spaced apart relationship to  
23           the displacement body, said second outer skirt structure having an  
24           outer surface that is substantially perpendicular with respect to the

25 static waterline and said second channel-defining structure defining a  
26 second channel with a cross-sectional surface that is generally arcuate;

27 the first and second channels extending from the fore end to the  
28 aft end and the first and second channels being adapted to capture a  
29 bow wave and to cause air and water to mix and spiral toward the aft  
30 end of the hull as compressed aerated water, thereby reducing friction  
31 drag, increasing lateral stability, and dampening transmission of bow  
32 wave energy at the aft end of the hull; and

33 the hull including at least one planing surface, at least one vertical  
34 step in the planing surface, an onboard propulsion engine, and means for  
35 venting exhaust from the onboard propulsion engine at the vertical step in  
36 the planing surface while under way in order to introduce gas along the  
37 planing surface.